

PAC05 Abstract

RF-Based Accelerators for HEDP Research

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Accelerator-driven High-Energy Density Physics experiments require typically 1 nanosecond, 1 microcoulomb pulses of $A \sim 20$ ions accelerated to several MeV to produce eV-level excitations in thin targets, the “warm dense matter” regime. Traditionally the province of induction linacs, RF-based acceleration may be a viable alternative with recent breakthroughs in accelerating structures and high-field compact superconducting solenoids. A reference design for an RF-based accelerator for HEDP research is presented using 15 T solenoids and multiple-gap RF structures configured with either multiple parallel beams (combined at the target) or a single beam and small stacking ring that accumulates 1 microcoulomb of charge. In either case, the beam is ballistically compressed with an induction linac core providing the necessary energy sweep and injected into a plasma-neutralized drift compression region resulting in a 1 mm radius beam 1 nanosecond long at a thin foil or low-density target.

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